VALIDATION COPY

Construction Engineering Technology Mississippi Curriculum Framework

Program CIP: 15.1001 – Construction Engineering Technology/Technician (Project Manager)

July 2016

Published by:
Mississippi Community College Board
Division of Workforce, Career, and Technical Education
3825 Ridgewood Road
Jackson, MS 39211
Phone: 601-432-6155
Email: curriculum@mccb.edu

Faculty Writing Team Members

Brian T. Donegan, Mississippi Gulf Coast Community College, Gulfport
Paul Strunk, Mississippi Gulf Coast Community College, Gulfport
Ray Gaillard, Northeast Mississippi Community College, Booneville

Administrator Writing Team Members

Dr. Beverly Clark, Career and Technical Education Dean,
Mississippi Gulf Coast Community College, Gulfport, MS
Pam Jones, Department Chair Career and Technical Education,
Mississippi Gulf Coast Community College, Gulfport, MS
Jody Presley, Career and Technical Education Division Head,
Northeast Mississippi Community College, Booneville, MS

Business and Industry Contributing Members

Christian Reed, Reed Plumbing and Mechanical, Booneville, MS
Morgan Whitfield, Prairie Construction, LLC, Managing Member, Tupelo, MS
Jackie R. Harris, Mississippi Department of Transportation, Resident Engineer, Senatobia, MS*
Tony Carroll, Sanderson Construction Company, Manager, Amory, MS
Freddie Rush, MS Valley Association of General Contractors, German Town, TN*
David Horton, Century Construction, Vice President, Tupelo, MS
Carlos Morales, Mallette Brothers Construction Company, Project Manager, Gautier, MS
*Denotes industry members who attended the writing meeting

Office of Curriculum and Instruction Team Members

Angela Bryan, Director of Curriculum and Instruction, Office of Curriculum and
Instruction, Mississippi Community College Board
Dr. Rachel M. De Vaughan, Curriculum Specialist, Office of Curriculum and Instruction,
Mississippi Community College Board
Krystal Berry, Curriculum Specialist, Office of Curriculum and Instruction,
Mississippi Community College Board

The Office of Curriculum and Instruction (OCI) was founded in 2013 under the Division of Workforce, Career, and Technical Education at the Mississippi Community College Board (MCCB). The office is funded through a partnership with The Mississippi Department of Education (MDE), who serves as Mississippi's fiscal agent for state and federal Career and Technical Education (CTE) Funds. The OCI is tasked with developing statewide CTE curriculum, programming, and professional development designed to meet the local and statewide economic demand.

CONTENTS

Research Abstract

The curriculum framework in this document reflects the changes in the workplace and a number of other factors that impact local vocational–technical programs. Federal and state legislation calls for articulation between high school and community college programs, integration of academic and vocational skills, and the development of sequential courses of study that provide students with the optimum educational path for achieving successful employment. National skills standards, developed by industry groups and sponsored by the U.S. Department of Education and Labor, provide vocational educators with the expectations of employers across the United States. All of these factors are reflected in the framework found in this document.

This curriculum was last validated and approved in 2009. In the spring of 2016, the Office of Curriculum and Instruction (OCI) met with several different business and industries in the southern and northern regions of MS. Program faculty, administrators, and industry members were consulted regarding industry workforce needs and trends. An industry questionnaire was used to gather feedback concerning the trends and needs, both current and future, of their field.

Industry advisory team members from colleges involved with this program were asked to give input related to changes to be made to the curriculum framework. Specific comments related to soft skills needed in this program include supervisors and managers understanding the intricacies of the job, understanding how to manage and supervise while following all codes and laws, and being able to analyze paperwork and forms. Occupation-specific skills stated include exhibiting the ability to analyze blueprint reading, awareness of safety guidelines, cost estimation, and troubleshooting. Safety practices emphasized include practicing all safety rules and wearing the proper safety equipment.

Instructors from colleges throughout the state were also asked to give input on changes to be made to the curriculum framework. Instructors added another student learning outcome to CON 1233 Construction Systems I regarding machinery. In CON 2233 Construction Systems II, another student learning outcome was added for students to demonstrate engineering design principles. A new course, CON 2523 Project Management was added to the curriculum document.

Revision History

2009-Research & Curriculum Unit, Mississippi State University
2016-Office of Curriculum & Instruction, Mississippi Community College Board

ADOPTION OF NATIONAL CERTIFICATION STANDARDS

The **National Center for Construction Education and Research (NCCER)** is a not-for-profit 501(c)(3) Education foundation created in 1996. It was developed with the support of more than 125 construction CEOs and various association and academic leaders who united to revolutionize training for the construction industry. Sharing the common goal of developing a safe and productive workforce, these companies created a standardized training and credentialing program for the industry. This progressive program has evolved into curricula for more than 70 craft areas and a complete series of more than 70 assessments offered in over 4,000 NCCER-accredited training and assessment locations across the United States.

NCCER develops standardized construction and maintenance curricula and assessments with portable credentials. These credentials are tracked through NCCER's National Registry which allows organizations and companies to track the qualifications of their craft professionals and/or check the qualifications of possible new hires. The National Registry also assists craft professionals by maintaining their records in a secure database.

NCCER's process of accreditation, instructor certification, standardized curriculum, national registry, assessment, and certification is a key component in the industry's workforce development efforts. NCCER also drives multiple initiatives to enhance career development and recruitment efforts for the industry. NCCER is headquartered in Alachua, Fl., and is affiliated with the University of Florida's M.E. Rinker, Sr. School of Building Construction.

As the accrediting body for the industry, NCCER establishes the benchmark for quality training and assessments. By partnering with industry and academia, NCCER has developed a system for program accreditation that is similar to those found in institutions of higher learning. This process fosters national unity among the construction industry while providing a defined career path with industry-recognized credentials.

NCCER's accreditation process assures that students and craft professionals receive quality training based on uniform standards and criteria. These standards are outlined in the NCCER Accreditation Guidelines and must be adhered to by all NCCER Accredited Training Sponsors and Accredited Assessment Centers.

For more information related to implementing NCCER at your local campus, please visit:

http://www.nccer.org

INDUSTRY JOB PROJECTION DATA

Project managers' occupations require an education level of an Associate of Applied Science degree. There is a 21.09% increase in occupational demand at the regional level and a 22.43% increase at the state level. Median annual income for employees who complete this program is $44,525.87 at the state level. A summary of occupational data from the State Workforce Investment Board Data Center is displayed below:

Table 1: Education Level

Program Occupations	Education Level
Cost estimators	Work Experience in Related Field
Civil engineering technicians	Associate Degree

Table 2: Occupational Overview

	Region	State	United States
2010 Occupational Jobs	1830	2234	260050
2020 Occupational Jobs	2216	2735	320042
Total Change	386	501	59992
Total % Change	21.09%	22.43%	23.07%
2010 Median Hourly Earnings	$20.11	$21.41	$25.76
2010 Median Annual Earnings	$41,818.40	$44,525.87	$53,582.34
Annual Openings	38	50	5999

Table 3: Occupational Breakdown

Description	2010 Jobs	2020 Jobs	Annual Openings	2010 Hourly Earnings	2010 Annual Earnings 2,080 Work Hours
Cost estimators	926	1143	21	$24.01	$49,940.80
Civil engineering technicians	904	1073	16	$16.20	$33,696.00
TOTAL	**1830**	**2216**	**38**	**$20.11**	**$41,818.40**

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Cost estimators	217	23.43%	28.37%	25.63%
Civil engineering technicians	169	18.69%	16.52%	16.94%

ARTICULATION

Articulation credit from Secondary Contren Learning Series programs to Postsecondary Construction Engineering Technology will be awarded upon implementation of this curriculum by the college. The course to be articulated is Fundamentals of Survey of Modern Construction (CON 1113), with the stipulations of passing the MS-CPAS2 according to MCCB guidelines and Contren Learning Series Core Certification.

SEC Program	PS Program	PS Courses
Secondary CONTREN Learning Series programs • S Building Trades (CIP 46.0000) • S Electrician (CIP 46.0302) • S Heating and Air Conditioning (CIP 47.0201) • S Industrial Maintenance Trades (CIP 47.0303) • S Masonry (CIP 46.0101) • S Metal Trades (CIP: 48.0590) • S Welding Theory and Applications (CIP 48.0508)	PS Construction Engineering Technology (CIP 15.1001)	CON 1113– Fundamentals of Survey of Modern Construction

TECHNICAL SKILLS ASSESSMENT

Colleges should report the following for students who complete the program with a career certificate, technical certificate, or an Associate of Applied Science Degrees for technical skills attainment. To use the approved Alternate Assessment for the following programs of study, colleges should provide a Letter of Notification to the Director of Career Technical Education at the MS Community College Board. Please see the following link for further instructions: http://www.mccb.edu/wkfEdu/CTDefault.aspx.

CIP Code	Program of Study	
15.1001	Construction Engineer Technology	
Level	**Standard Assessment**	**Alternate Assessment**
Career	MS-CPAS-1 Postsecondary Construction Engineering Technology: Year 1	NCCER Core Exam
Technical/AAS	MS-CPAS-2 Postsecondary Construction Engineering Technology: Year 2	NCCER Project Management Exam NCCER Project Supervision Exam

Certification and Licensure Prices:

NCCER Core, Project Management, Project Supervision $45.00 each assessment

ONLINE AND BLENDED LEARNING OPPORTUNITIES

Course content includes lecture and laboratory semester credit hours. Faculty members are encouraged to present lecture related content to students in an online or blended learning environment. Training related to online and blended learning will be available to faculty members through the MS Community College Board.

Instructional Strategies

Instructional strategies for faculty members implementing the curriculum can be found through the Office of Curriculum and Instruction's professional development.

Assessment Strategies

The Office of Curriculum and Instruction's professional development offer assessment strategies to faculty members implementing the curriculum. Additionally, standards were included in course content when appropriate.

Credit by Examination

Credit by examination will be considered for courses that correlate with the NCCER standards.

Program Description

The Construction Engineering Technology (CON) program is an instructional program designed to prepare technicians for employment within the construction industries and firms in mid-level management operations as estimators, planners, project managers, layout specialists, or other construction operations. Individuals currently employed as professionals will enhance their ability to perform their duties in the construction business.

This curriculum leads to an Associate of Applied Science degree. Students completing the program will be prepared for jobs in supervision, estimating, layout, cost control, materials procurement, safety, leadership, and organization of construction projects. In the program, students learn workplace environmental and safety issues. They also learn how to identify safety hazards and notify the proper authorities.

Certifications and/or training can include:

- National Center for Construction Education and Research (NCCER)
- OSHA 10-hr and/or 30-hr training
- Competent Person Training in Excavations
- Competent Person Training in Confined Spaces
- American Concrete Institute grade 1 testing certificate
- Quality Control in Army Corp of Engineers

This curriculum has been aligned to modules in the Contren program as endorsed by the National Center for Construction Education and Research (NCCER). Students who study this curriculum using the Contren materials under the supervision of an instructor who has been certified by the NCCER are eligible to be tested on each module. Students who successfully pass these tests may be certified to the NCCER by the instructor and will receive documentation from NCCER.

VALIDATION COPY

SUGGESTED COURSE SEQUENCE

Accelerated Pathway Credential

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
CON 1113	Survey of Modern Construction	3	2	2		60	30	
CON 1213	Construction Materials	3	2	2		60	30	
	Instructor approved electives	9						
	Total	**15**						

Career Certificate Required Courses

			SCH Breakdown				Contact Hour Breakdown			Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Clinical/ Internship	Total Contact Hours	Lecture	Lab	Clinical/ Internship	Certification Name
CON 1113	Survey of Modern Construction	3	2	2		60	30	30		-OSHA 10 -NCCER Core -American Concrete Institute Grade 1 Testing Certificate
CON 1213	Construction Materials	3	2	2		60	30	30		
CON 1223	Plans and Document Interpretation	3	2	2		60	30	30		
CON 1233	Construction Systems I	3	2	2		60	30	30		
	Instructor approved technical electives	18								
	TOTAL	**30**								

Technical Certificate Required Courses

			SCH Breakdown				Contact Hour Breakdown			Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Clinical/ Internship	Total Contact Hours	Lecture	Lab	Clinical/ Internship	Certification Name
CON 2313	Construction Layout	3	2	2		60	30	30		NCCER -Project Management -Project Supervision -OSHA 30 -Competent Person Training in Excavations
CON 2123	Construction Cost Estimation	3	2	2		60	30	30		
CON 2113	Construction Job Site Management	3	2	2		60	30	30		
CON 2413	Construction Safety Standards	3	2	2		60	30	30		
CON 2513	Leadership and Organization	3	2	2		60	30	30		
	Total	**15**								

General Education Core Courses

To receive the Associate of Applied Science Degree, a student must complete all of the required coursework found in the Career Certificate option, Technical Certificate option and a minimum of 15 semester hours of General Education Core. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester or provided primarily within the last semester. Each community college will specify the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college. The Southern Association of Colleges and Schools (SACS) Commission on Colleges Standard 2.7.3 from the Principles of Accreditation: Foundations for Quality Enhancement1 describes the general education core.

Section 2.7.3 In each undergraduate degree program, the institution requires the successful completion of a general education component at the collegiate level that (1) is substantial component of each undergraduate degree, (2) ensures breadth of knowledge, and (3) is based on a coherent rationale. For degree completion in associate programs, the component constitutes a minimum of 15 semester hours or the equivalent. These credit hours are to be drawn from and include at least one course from the following areas: humanities/fine arts, social/behavioral sciences, and natural science/mathematics. The courses do not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession.

[1] Southern Association of Colleges and Schools Commission on Colleges. (2012). *The principles of accreditation: Foundations for quality enhancement*. Retrieved from http://www.sacscoc.org/pdf/2012PrinciplesOfAcreditation.pdf

General Education Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	Lecture	Lab	Certification Name
	Humanities/Fine Arts	3						
	Social/Behavioral Science	3						
	Math/Natural Science	3						
	Instructor approved academic electives	6						
	TOTAL	**15**						

*Construction Engineering Technology students are encouraged to take MAT 1313 College Algebra, MAT 1323 Trigonometry, and PHY 2414 Physics I to be better prepared for advanced coursework and employability.

Technical Electives

			SCH Breakdown				Contact Hour Breakdown			Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Clinical/ Internship	Total Contact Hours	Lecture	Lab	Clinical/ Internship	Certification Name
CON 1313	Construction Drawing	3	2	2		60	30	30		
CTE 1143	NCCER Core	3	2	2		60	30	30		
CON 1113	Survey of Modern Construction	3	2	2		60	30	30		
CON 1213	Construction Materials	3	2	2		60	30	30		
CON 1223	Plans and Document Interpretation	3	2	2		60	30	30		
CON 1233	Construction Systems I	3	2	2		60	30	30		
CON 261(3–6)	Internship in Construction Engineering Technology	3-6			3-6	135-270			135-270	
CON 262(3–6)	Internship in Construction Engineering Technology	3-6			3-6	135-270			135-270	
CON 2313	Construction Layout	3	2	2		60	30	30		
CON 2123	Construction Cost Estimation	3	2	2		60	30	30		
CON 2233	Construction Systems II	3	2	2		60	30	30		
CON 2113	Construction Job Site Management	3	2	2		60	30	30		
CON 2413	Construction Safety Standards	3	2	2		60	30	30		
CON 2513	Leadership and Organization	3	2	2		60	30	30		
CON 2523	Project Management	3	2	2		60	30	30		
BAD 2413	Legal Environment of Business	3	3			45	45			
DDT 1313	Principles of CAD	3	3			45	45			
DDT 1413	Computer Aided Design I	3	2	2		60	30	30		
DDT 1423	Computer Aided Design II	3	3			45	45			
DDT 2153	Civil Planning and Design	3	1	4		75	15	60		
CON 291(1–3)	Special Problem in Construction Engineering Technology	1-3		2-6		30-90		30-90		
CON 292(1–6)	Supervised Work Experience in Construction Engineering Technology	1-6			3-18	45-270			45-270	

CPT 1113	Fundamentals of Microcomputer Applications	3	3			45	45			
CSC 1113	Introduction to Computer Concepts	3	3			45	45			
ACC 1213	Principles of Accounting I	3	3			45	45			
CON 2243	Construction Systems III	3	2	2		60	30	30		
DDT 2253	Statics and Strength of Materials	3	3			45	45			
DDT 1613	Architectural Design I	3	3			45	45			
DDT 1163	Engineering Graphics	3	2	2		60	30	30		
WBL 191(1-3) WBL 192(1-3) WBL 193(1-3) WBL 291(1-3) WBL 292(1-3) WBL 293(1-3)	Work-Based Learning	1-6			3-18	45-270			45-270	
IMM 1935	Manufacturing Skills Basic	5	2	6		120	30	90		
DDT 2823	Revit Architectural 3-D Modeling	3	1 *OR* 2	4 *OR* 2		75 *OR* 60	15 *OR* 30	60 *OR* 30		
	Other instructor approved electives									

CONSTRUCTION ENGINEERING TECHNOLOGY COURSES

Course Number and Name: **CON 1113** **Survey of Modern Construction**

Description: Fundamentals of the construction environment, methods, materials, and processes from a historical perspective, and the impact on the construction industry.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Interpret the importance of the construction industry.

2. Recognize the major historical advancements in the construction industry.

3. Examine the influence of construction technology.
    a. Describe the advancements in construction equipment.
    b. Discuss the significance of GPS technology in the construction industry.
    c. Explain the major technological advances in materials.

NCCER Standards

Project Management

MODULE 44101-08 – INTRODUCTION TO PROJECT MANAGEMENT

1. Define project.
2. Describe the characteristics of a project manager.
3. Describe the basic functions of project management.
4. Cite the importance of ethical approaches to project management.
5. Discuss the flow and phases of a construction project.
6. Describe the four common construction delivery systems.

Project Supervision

MODULE MT201 – ORIENTATION TO THE JOB

1. Explain the scope and purpose of the Project Supervision program.
2. Understand the role of a construction supervisor.
3. Explain the history, trends, and economic conditions affecting the construction industry.
4. Outline the progress of a successful construction project from initial development through completion.
5. Identify the milestones in the growth of a construction company and the reasons for a formal and infor- mal organizational development.
6. Explain the functions of management.
7. Explain the purpose and content of a satisfactory job description.
8. Discuss company policies and procedures.

VALIDATION COPY

Course Number and Name: **CON 1213** **Construction Materials**

Description: This is a course designed to provide a study and testing of the various materials used in the construction industry including wood, steel, concrete, and soils.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Describe how soil relates to construction.
    a. Describe the various machine applications.
    b. Visually classify soils.
    c. Perform a standard proctor soils test.

2. Explain the properties, placement, and tests for concrete.
    a. Describe various engineering tests including slump, compression, and air content to determine strength requirements.
    b. Explain placing requirements for cold and hot weather, underwater, and vertical fall.
    c. Compare different types of forming systems to include reusable metal form, metal form, tilt-up form, and earthen formwork.
    d. Discuss admixtures for Portland cement concrete.

3. Compare the different properties and uses of wood as a building material.
    a. Explore treated wood and polymerized components.
    b. Discuss dimension lumber and sawing techniques.
    c. Examine types and grades of wood.
    d. Describe the methods of wood protection against environmental decomposition and pest invasion.

4. Describe the uses of steel as a building component.
    a. Discuss the basic manufacturing process of making steel.
    b. Identify the basic steel shapes used in construction.
    c. Explain manufactured steel truss, beams, and rigid frame design.
    d. Examine the various types of connections used in steel construction.
    e. Differentiate between the various types of steel protective coatings.

NCCER Standards

Core

Module 00109-15 – Introduction to Material Handling

1. Describe the basic concepts of material handling and common safety precautions.
    a. Describe the basic concepts of material handling and manual lifting.
    b. Identify common material-handling safety precautions.
    c. Identify and describe how to tie knots commonly used in material handling.
2. Identify various types of material handling equipment and describe how they are used.
    a. Identify non-motorized material-handling equipment and describe how they are used.
    b. Identify motorized material-handling equipment and describe how they are used.

American Concrete Institute Grade 1 Testing Certificate

Concrete Field Testing Grade I Certification Training –

1. Making and Curing Concrete Test Specimens in the Field

a. standard procedures for making and curing cylinder and beam specimens from representative samples of fresh concrete.
b. identify the need for molding concrete test specimens in the field;
c. describe the testing requirements, apparatus, and procedures for molding specimens;
d. identify the need, methods, and requirements for curing specimens; and
e. describe the standard requirements for transporting concrete specimens to a laboratory for testing

2. Sampling and Testing Freshly Mixed Concrete
    a. explain the need and describe the standard requirements and procedures for sampling freshly mixed concrete
    b. describe the procedure and identify the testing apparatus for measuring the temperature of concrete

3. Slump of Hydraulic-Cement Concrete
    a. explain the procedures for determining the slump of hydraulic-cement concrete, both in a laboratory and in the field. define “slump”;
    b. describe the procedure and identify the testing apparatus for measuring the slump of freshly mixed hydraulic-cement concrete;
    c. report the slump test result using appropriate terminology

4. Testing Air Content of Concrete by the Pressure Method
    a. identify the apparatus and describe the procedure used for measuring the air content of concrete with a Type B meter; calculate the Aggregate Correction Factor using experimental data
    b. calculate the air content of concrete used as the test sample;
    c. identify the information to be reported in the test results

5. Testing Air Content of Concrete by the Volumetric Method
    a. identify the apparatus and describe the procedure used for measuring the air content of concrete using the volumetric method;
    b. calculate the air content of concrete used as the test sample

6. Testing for Density, Yield, and Air Content of Concrete
    a. define the terms density, yield, and air content;
    b. identify the apparatus, appropriate consolidation method, and procedure used to measure the density of concrete; identify basic terminology associated with the calculation of density, yield, and air content;
    c. calculate density, yield, and air content; and
    d. identify the information to be reported.

Course Number and Name: **CON 1223** **Plans and Document Interpretation**

Description: This is a course designed to provide graphic techniques used in the construction industry. This course includes computation of areas and volumes, interpretation of construction plans and specifications, and symbols and terms used in the residential, commercial, and heavy construction industry.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Interpret construction prints.
    a. Read and interpret typical construction blueprints.
    b. Read and interpret symbols, layout, and organizations of plans.
    c. Identify terms as related to construction prints.

2. Recognize construction plans as contract documents.
    a. Using a site plan, determine if the amount of dirt to be moved will balance.
    b. Explain the technical specifications as per construction plans.
    c. Identify quantities from plans and obtain volumes and areas for concrete, coatings, and so forth.

3. Interpret specifications.
    a. Identify the basic specifications of a contract document.
    b. Explain the specifications as they relate to money.

NCCER Standards

Core

Module 00105-15 – Introduction to Construction Drawings

1. Identify and describe various types of construction drawings, including their fundamental components and features.
    a. Identify various types of construction drawings.
    b. Identify and describe the purpose of the five basic construction drawing components.
    c. Identify and explain the significance of various drawing elements, such as lines of construction, symbols, and grid lines.
    d. Identify and explain the use of dimensions and various drawing scales.
    e. Identify and describe how to use engineer's and architect's scales.

Project Management

MODULE 44105-08 – CONSTRUCTION DOCUMENTS

1. Explain the need for documentation on a project.
2. State the various approaches for obtaining work in the construction industry.
3. Identify the parts of a typical project manual.
4. Identify the various types of drawings and format specifications.
5. Discuss the types of contracts used in the construction industry.
6. Discuss insurance requirements for a company and a project.
7. List the types of documents used on a project.
8. Describe the change order process.
9. List the documents necessary to close out a project.

Project Supervision

MODULE MT205 – CONTRACT AND CONSTRUCTION DOCUMENTS

1. Define construction documents and project manuals.
2. Read and interpret construction drawings.
3. Recognize the types (components) of working drawings and specifications.
4. Explain the methods of obtaining work in the construction industry.
5. Identify the types of contracts used in the industry.
6. Explain the need for documentation and the types of documents used on a project.
7. Identify the documents necessary to close out a project.

VALIDATION COPY

Course Number and Name: **CON 1233 Construction Systems I**

Description: This is a course designed to provide a study of common practices of engineering principles and construction methods.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explain the different types of residential, commercial, and heavy construction.
    a. Describe the construction applications of wood and steel.
    b. Identify the major tools and machinery required for residential, commercial, and heavy construction including the safe use of each.

2. Identify various types of foundations.
    a. Identify the various types of foundation materials.
    b. Describe problems encountered in regard to water and poor soil.

3. Identify different types of wall and roofing systems.
    a. Identify tilt-up practices.
    b. Identify prefab applications.
    c. Identify various roofing systems.

4. Describe money as a function of capital.
    a. Calculate money as a function of time.
    b. Demonstrate a profit and loss balance sheet.
    c. Explain owning and operating costs.

5. Describe machinery production.
    a. Read tabulated data to determine cycle times.
    b. Use the cycle times to determine the most efficient choice.

VALIDATION COPY

Course Number and Name: **CON 1313 Construction Drawing**

Description: This course is designed to give construction students the background needed for understanding and interpreting construction drawings.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Discuss classroom procedures and drafting occupations.
    a. Describe proper lab procedures.
    b. Describe various occupations in drafting and their requirements.

2. Demonstrate the ability to apply proper techniques in technical drawing.
    a. Demonstrate the ability to develop sketches and scale drawings.
    b. Construct various angles.
    c. Use perspective for a more detailed drawing.

3. Demonstrate the ability to use the basic hardware of the CAD system.
    a. Input data using keyboard and graphics tablet.
    b. Access files and/or symbols from the hard drive.
    c. Store, retrieve, copy, and delete drawings and files.

4. Demonstrate the ability to perform drafting functions on the CAD system.
    a. Construct a single view drawing.
    b. Modify/edit an existing drawing.
    c. Modify the existing system variables.

5. Demonstrate the ability to develop a three-dimensional model.
    a. Describe the model as an X, Y, and Z axis function.
    b. Construct a plane by entering coordinate points.
    c. Describe templates and layers.
    d. Demonstrate the TIN process.
    e. Demonstrate volume calculations by layering.

Course Number and Name: **CON 2113** **Construction Jobsite Management**

Description: This is a course designed to provide a study of basic techniques of the modern methods of managing construction projects including scheduling, resource allocation, and funds flow. Practical applications are made through simulated projects.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Describe the factors to be considered by reviewing contract documents.
    a. Describe construction equipment availability.
    b. Develop a submittal registry.
    c. Using the Internet, obtain information that will be used for submittal entries.
    d. Develop material for a technical specification and submit for approval.
    e. Describe the availability of subcontractors.
    f. Examine a subcontract.
    g. Describe what a change order is and the role of a supervisor in its implementation.
    h. Demonstrate how a pay request is developed.
    i. Refer to EPA regulations and identify storm water run-off and permit requirements.

2. Explain how to sequence job functions using manual and scheduling software processes.
    a. Interpret bar charts.
    b. Explain construction activities and how they relate to the construction schedule.
    c. Demonstrate the process of cash flow and the management of cost projections.
    d. Develop a job schedule using appropriate scheduling software.
    e. Demonstrate the process of maintaining daily logs.

NCCER Standards

Project Management

MODULE 44101-08 – INTRODUCTION TO PROJECT MANAGEMENT

1. Define project.
2. Describe the characteristics of a project manager.
3. Describe the basic functions of project management.
4. Cite the importance of ethical approaches to project management.
5. Discuss the flow and phases of a construction project.
6. Describe the four common construction delivery systems.

MODULE 44106-08 – CONSTRUCTION PLANNING

1. Explain the importance of planning a job.
2. Create a performance-based work environment.
3. Explain the importance of scope and the work breakdown structure.
4. State the differences among the pre-construction, construction, and review phases of planning.
5. Describe how the planning process is carried out.
6. Define the roles and responsibilities of an effective team and how to allocate resources.
7. Define commodities, engineered equipment, construction equipment, and construction supplies.
8. Describe how to implement a plan.

MODULE 44109-08 – RESOURCE CONTROL

1. List the five elements of production control.

2. Recognize when production is in control.
3. Describe the role of reports in production control.
4. Identify and explain the major factors which affect production control.
5. Describe methods for alleviating the negative effects of the major production control factors.
6. List the three production standards and specify when they are to be used.
7. Explain the three methods for evaluating productivity.
8. Explain and give examples of production control alternatives.
9. Identify the resources that must be controlled and the project manager ’s role in the process.
10. Describe the role of the project manager in evaluating production both during and after a project.
11. Define debriefing and describe how it is accomplished and its value to production control

MODULE 44105-08 – CONSTRUCTION DOCUMENTS

1. Explain the need for documentation on a project.
2. State the various approaches for obtaining work in the construction industry.
3. Identify the parts of a typical project manual.
4. Identify the various types of drawings and format specifications.
5. Discuss the types of contracts used in the construction industry.
6. Discuss insurance requirements for a company and a project.
7. List the types of documents used on a project.
8. Describe the change order process.
9. List the documents necessary to close out a project.

MODULE 44108-08 – SCHEDULING

1. Establish personal task priorities and delegate tasks.
2. Describe the purposes and benefits of using formal project schedules and why it is important to main- tain schedules.
3. Identify basic project scheduling terms and inputs.
4. Develop a bar chart schedule.
5. Develop and interpret a network diagram.
6. Identify alternative scheduling methods.
7. Develop and calculate CPM schedules to include early start, early finish, late start, late finish, and total float.
8. Analyze an existing CPM schedule to optimize the project schedule.
9. Update and maintain a project schedule, including establishing baselines and targets.
10. Determine the effects of a change to the schedule.

MODULE 44110-08 – QUALITY CONTROL AND ASSURANCE

1. Define quality control and quality assurance.
2. Describe the essential components of an effective quality control and assurance program (or process).
3. Explain how to develop an effective quality control and assurance process.
4. Explain how to monitor the causes and costs of rework.

Project Supervision

MODULE MT204 – QUALITY CONTROL

1. Define quality control.
2. Explain the difference between traditional and total quality control systems.
3. Discuss how quality control and safety go hand-in-hand during construction.
4. Explain the supervisor ’s responsibility for quality control.
5. Explain the benefits of implementing a quality control system.

MODULE MT207 – PLANNING AND SCHEDULING

1. Describe the link between planning and scheduling.
2. Describe how the planning process is carried out.
3. Write a goal statement and an objective.
4. Create a step-by-step list of the tasks that will complete a project.
5. Describe the various resources that need to be considered when planning a job.

6. Assign resources to each activity in a list.
7. Explain how to conduct a job analysis.
8. Develop a bar chart.
9. Explain the purpose of network diagrams.
10. List the benefits of short-interval schedules.

MODULE MT208 – RESOURCE CONTROL AND COST AWARENESS

1. State why it is important to control resources on the job.
2. Define productivity and explain how it differs from production.
3. List several factors which affect productivity and determine how to solve problems relative to produc- tivity.
4. Describe how job-site productivity can be improved.
5. Describe how a five-minute rating is developed and how it can be used to improve productivity.
6. Explain how a crew balance chart is developed and how it can be used to improve productivity.
7. Describe how to complete a supervisor ’s delay survey and how it can be used to improve productivity.
8. Describe how to control the various job resources.
9. Explain the importance of being aware of costs on the job.
10. Define estimated cost, actual cost, and projected cost.
11. Describe the different parts of a job reporting system.
12. Define production analysis and perform a simple production analysis.
13. Discuss the impact of improper cost reporting.

VALIDATION COPY

Course Number and Name: **CON 2123** **Construction Cost Estimation**

Description: This is a course designed to provide a study of the estimating, quantity survey, unit cost synthesis and analysis, bid organization and planning, and competitive simulations and exercises.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Student Learning Outcomes:

1. Examine the unique role of construction in today's business and industry.
    a. Describe the different types of bids.
    b. Discuss the contents of contract documents.
    c. Explain the economics and requirements of the bidding process.

2. Explain the overhead costs.
    a. Define the various overhead costs of a company.
    b. Demonstrate the ways of returning overhead costs in the bid.
    c. Describe the effects of overhead costs related to volume of work and profit.

3. Explain direct costs of materials, labor, and equipment of a contract.
    a. Describe the relationship of material, labor, and equipment to each other.
    b. Demonstrate how these costs may be returned in the contract.
    c. Describe absorbed costs of a contract.

4. Develop a simulated construction bid.
    a. Prepare a materials estimate for a construction bid.
    b. Prepare a labor estimate for a construction bid.
    c. Prepare an equipment estimate for a construction bid.

NCCER Standards

Project Management

MODULE 44107-08 – ESTIMATING AND COST CONTROL

1. Define cost control and identify the purpose of a cost control system.
2. Define budgeted (estimated) cost, actual cost, and projected cost.
3. Define the importance of accurate estimates
4. Explain the project manager 's role in controlling cost.
5. Describe what a reporting system is and how it functions in a cost control system.
6. Explain the process of making a cost analysis.
7. Perform a simple cost analysis.
8. Describe how to track and document the causes and costs of rework.

Project Supervision

MODULE MT206 – DOCUMENT CONTROL AND ESTIMATING

1. Describe the importance of document control.
2. Discuss your role as a project supervisor in document control.
3. Explain the estimating process.
4. Complete a simple material estimate.

VALIDATION COPY

Course Number and Name: **CON 2233** **Construction Systems II**

Description: This is a course designed to provide common practices of construction using engineering techniques to determine relations between equipment production and design criteria.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Student Learning Outcomes:

1. Identify various types of foundations.
    a. Present solutions to problems encountered in regard to water and poor soil.
    b. Develop a dewatering plan.

2. Identify and discuss different types of dirt moving.
    a. Present a plan for offsite fill.
    b. Develop cycle times from compiled data to determine the most cost-effective way to move a given amount of dirt for a known length of haul.
    c. Present a plan for on-site fill.
    d. Identify various soil moving equipment.

3. Demonstrate concrete formwork design.
    a. Explain whalers, ties, plyform, and studs.
    b. Use tabulated data to design a form.
    c. Build a concrete wall.

4. Explain pile driving.
    a. Describe the various types of piles.
    b. Discuss the different types of cranes.
    c. Identify the various types of pile drivers.
    d. Explain the set and number of blows.
    e. Discuss tip, cutoff, and refusal.

5. Demonstrate engineering design principles
    a. Identify the principles in basic rigging
    b. Explain the principles in loading a truck

VALIDATION COPY

Course Number and Name: **CON 2243 Construction Systems III**

Description: This course is designed to give a study of material properties and common practices of design and construction of civil/highway structures. The operation and cost of construction machinery and equipment, power generating equipment, and powered fastening systems will be covered.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explain the types of road/civil construction methods.
    a. Discuss the nature, properties, and use of construction materials.
    b. Examine the principles of roadbed construction.
    c. Describe the environmental impact of highways.
    d. Explore the techniques of highway maintenance and rehabilitation.
    e. Describe the construction of cuts and fills.

2. Explain the types of drainage structure, construction methods, and materials.
    a. Describe the nature, properties, and use of drainage structure materials and equipment.
    b. Demonstrate the construction procedures and processes of drawing drainage and structures.

3. Explain the various operation and costs of construction equipment, machinery, and power generating equipment.
    a. Calculate the cost incurred in the use of typical equipment and machinery.
    b. Demonstrate the operation of the various construction equipment and machinery.
    c. Demonstrate the required power generating equipment needed on various construction projects.

4. Demonstrate the use of powered fastening systems.
    a. Identify the necessary powered fastening devices for a project.
    b. Explain the use of powered fastening devices.
    c. Demonstrate the safe use of powered fastening devices..

VALIDATION COPY

Course Number and Name: **CON 2313** **Construction Layout**

Description: This is a course designed to provide principles of site preparation and layout of structures. Students will use levels, tapes, and surveying instruments. Triangle calculations, differential leveling, and erection of batter boards and markers are included.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify all phases of the layout of a structure.
    a. Demonstrate the use of batter boards, string lines, and stakes for foundation layout of structures.
    b. Define terms related to site preparation.
    c. Explain the coordinate system.
    d. Identify the job control points.

2. Demonstrate use of a total station and auto level.
    a. Set up an auto level, and conduct a loop of elevations.
    b. Shoot the necessary points for a roadway as per the plan(s).
    c. Shoot and record elevations needed for the slope stakes and cross sections.
    d. Determine the amount of fill/cut.
    e. Time each phase of total station and auto level use to enforce speed as a function of laying out work.

3. Demonstrate the use of the GPS Rover system.
    a. Describe the localization process.
    b. Explain the initialization process.
    c. Find points using information in the data collector.
    d. Build a layer using the topography function.
    e. Calculate volumes of dirt using layers.
    f. Construct a model using 3-D software.

VALIDATION COPY

Course Number and Name: **CON 2413 Construction Safety Standards**

Description: This is a course designed to provide management of safety and health in the construction environment. Basic elements of a safety and health program for the construction general contractor are examined to include Occupational Safety and Health Administration (OSHA).

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Examine basic national trenching laws.
    a. Describe the purpose of the laws.
    b. Discuss the various soil conditions.
    c. Demonstrate the procedures for setting up shoring structures.

2. Develop a plan to meet OSHA standards.
    a. Explain an experience modifier.
    b. Describe how to calculate a loss control.
    c. Locate OSHA regulations.

3. Develop a safety policy.
    a. Explain safety as a cost savings to construction companies.
    b. Discuss safety culture as a prominent way to influence safety on the jobsite.
    c. Examine the importance of the safety policy as a means to a successful safety program.
    d. Identify appropriate rewards and penalties for compliance and noncompliance of the policy.

4. Examine confined spaces laws.
    a. Describe the purpose of the laws.
    b. Discuss the various conditions.
    c. Demonstrate the procedures for confined space entry.

5. Demonstrate the understanding of crane safety
    a. Operator certification
    b. Assemble/disassemble
    c. Critical lift operations
    d. Crane inspection

NCCER Standards

Core

Module 00101-15 – Basic Safety (construction Site Safety Orientation)

1. Describe the importance of safety, the causes of workplace incidents, and the process of hazard recognition and control.
    a. Define incidents and the significant costs associated with them.
    b. Identify the common causes of incidents and their related consequences.
    c. Describe the processes related to hazard recognition and control, including the Hazard Communication (HAZCOM) Standard and the provisions of a Safety Data Sheet (SDS).

2. Describe the safe work requirements for elevated work, including fall protection guidelines.
    a. Identify and describe various fall hazards.
    b. Identify and describe equipment and methods used in fall prevention and fall arrest.
    c. Identify and describe the safe use of ladders and stairs.

d. Identify and describe the safe use of scaffolds.

3. Identify and explain how to avoid struck-by and caught-in-between hazards.
    a. Identify and explain how to avoid struck-by and caught-in-between hazards.
    b. Identify and explain how to avoid caught-in and caught-between hazards.

4. Identify common energy-related hazards and explain how to avoid them.
    a. Describe basic job-site electrical safety guidelines.
    b. Explain the importance of lockout/tag out and describe basic procedures.

5. Identify and describe the proper use of personal protective equipment (PPE).
    a. Identify and describe the basic use of PPE used to protect workers from bodily injury.
    b. Identify potential respiratory hazards and the basic respirators used to protect workers against those hazards.

6. Identify and describe other specific job-site safety hazards.
    a. Identify various exposure hazards commonly found on job sites.
    b. Identify hazards associated with environmental extremes.
    c. Identify hazards associated with hot work.
    d. Identify fire hazards and describe basic firefighting procedures.
    e. Identify confined spaces and describe the related safety considerations.

Module 00103-15 – Introduction to Hand Tools

1. Identify and explain how to use various types of hand tools.
    a. Identify and explain how to use various types of hammers and demolition tools.
    b. Identify and explain how to use various types of chisels and punches.
    c. Identify and explain how to use various types of screwdrivers.
    d. Identify and explain how to use various types of non-adjustable and adjustable wrenches.
    e. Identify and explain how to use various types of socket and torque wrenches.
    f. Identify and explain how to use various types of pliers and wire cutters.
2. Identify and describe how to use various types of measurement and layout tools.
    a. Identify and explain how to use rules and other measuring tools.
    b. Identify and explain how to use various types of levels and layout tools.
3. Identify and explain how to use various types of cutting and shaping tools.
    a. Identify and explain how to use handsaws.
    b. Identify and explain how to use various types of files and utility knives.
4. Identify and explain how to use other common hand tools.
    a. Identify and explain how to use shovels and picks.
    b. Identify and explain how to use chain falls and come-alongs.
    c. Identify and explain how to use various types of clamps.
    d.

Module 00104-15 – Introduction to Power Tools

1. Identify and explain how to use various types of power drills and impact wrenches.
    a. Identify and explain how to use common power drills and bits.
    b. Identify and explain how to use a hammer drill.
    c. Identify and explain how to use pneumatic drills and impact wrenches.
2. Identify and explain how to use various types of power saws.
    a. Identify and explain how to use a circular saw.
    b. Identify and explain how to use a saber and reciprocating saws.
    c. Identify and explain how to use a portable band saw.
    d. Identify and explain how to use miter and cutoff saws.

3. Identify and explain how to use various grinders and grinder attachments.
    a. Identify and explain how to use various types of grinders.
    b. Identify and explain how to use various grinder accessories and attachments.

4. Identify and explain how to use miscellaneous power tools.
    a. Identify and explain how to use pneumatic and powder-actuated fastening tools.
    b. Identify and explain how to use pavement breakers.
    c. Identify and explain the uses of hydraulic jacks.
    d.

Project Management

MODULE 44102-08 – SAFETY

1. Recognize the need for an effective job site safety and loss prevention program.
2. Identify the project manager ’s duties and responsibilities with respect to safety and loss prevention.
3. Identify the direct and indirect cost of accidents.
4. Identify potential areas for loss and evaluate the risks.
5. Identify methods of risk control.
6. Understand OSHA’s Focused Inspection Program.
7. Evaluate subcontractors on the basis of past safety experience.
8. Identify the need for and types of employee participation in safety programs.
9. List things to be considered when dealing with the press.
10. Plan, implement, and evaluate a job site safety program with assistance from staff safety professionals or outside consultants.

Project Supervision

MODULE MT203 – SAFETY

1. Describe the safety responsibilities of supervisors.
2. Determine the real cost of accidents, including direct and indirect costs.
3. Identify the basic components of a safety program.
4. Explain how to conduct a safety inspection and employee observation.
5. Describe how to confront and deal with a worker who was observed performing an unsafe act.
6. Explain how to perform an accident investigation and complete the necessary report forms.
7. Identify the components of effective safety meetings.
8. Define qualified person and competent person.

Course Number and Name: **CON 2513 Leadership and Organization**

Description: This is a course designed to provide a study of the effective leadership and management styles in the construction industry. This includes organization of the construction industry at the local, state, and national levels.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explain the role of leadership.
    a. Describe the role of a manager in the industry.
    b. Identify the role and personal qualities of an effective leader/supervisor.
    c. Discuss the Equal Employment Opportunity Commission (EEOC) laws and regulations.

NCCER Standards

Core

Module 00107 – 15 – Basic Communication Skills

1. Describe the communication, listening, and speaking processes and their relationship to job performance.
    a. Describe the communication process and the importance of listening and speaking skills.
    b. Describe the listening process and identify good listening skills.
    c. Describe the speaking process and identify good speaking skills.
2. Describe good reading and writing skills and their relationship to job performance.
    a. Describe the importance of good reading and writing skills.
    b. Describe job-related reading requirements and identify good reading skills.
    c. Describe job-related writing requirements and identify good writing skills.

Project Management

MODULE 44103-08 – INTERPERSONAL SKILLS

1. Briefly describe workforce expectations.
2. Describe how stakeholders are identified.
3. Define effective communication skills.
4. Apply human relations skills to the project management role.
5. Apply the Managerial Grid.
6. Define the leadership environment.
7. Describe mentoring and coaching.
8. Apply behavioral interview techniques.
9. Construct professional development plans.

Module 44104-08 – Issues and Resolutions

1. Identify signs of incompetent problem solving and negative problem identification climates.
2. Identify four major barriers to problem solving.
3. Demonstrate these problem solving techniques:
    - Eight-step ladder
    - Fact-finding
    - Root cause diagram
    - Brainstorming
4. Name five key elements of successful negotiation.
5. List four universal truths of negotiation.
6. Cite the four phases of negotiation.

7. Identify and explain the eight negotiating techniques and how to respond to them.
8. Recognize communication cues.
9. Describe the stages of dispute resolution.

MODULE 44111-08 – CONTINUIOUS IMPROVEMENT

1. Describe the project manager ’s role in the culture of continuous improvement.
2. Explain the fundamentals of a comprehensive continuous improvement process as it relates to a project and company.
3. Present the objectives and explain the basic steps in implementing a continuous improvement process.
4. Describe some applications of continuous improvement.
5. Describe how to measure improvement.
6. Explain the importance of recognizing employees for embracing the continuous improvement process along with some of the major methods.

Project Supervision

MODULE MT202 – HUMAN RELATIONS AND PROBLEM SOLVING

1. State how a supervisor ’s performance is evaluated. Identify the challenges that the transition into supervision brings.
2. List the resources, techniques, and characteristics a successful leader uses to get the job done.
3. State the advantages of using various approaches to lead people effectively.
4. Communicate effectively.
5. Complete a task analysis.
6. Name nine essential elements on a job orientation checklist.
7. List the six steps for on-the-job training.
8. Explain the nine steps for conducting a performance appraisal.
9. Identify the root causes of performance problems and how to handle conflict.
10. Explain how moving up the management ladder affects a supervisor ’s ownership of time.
11. Construct a "To Do List" for on-the-job use.
12. Explain the nature of managerial decision making and problem solving.
13. Determine the relationship between problem solving and decision making.
14. Identify environmental influences on decision making.
15. Cite the advantages and disadvantages of group involvement in decision making.
16. Distinguish between routine (programmed) and non-routine (non-programmed) decisions.
17. Describe the critical role of implementation and evaluation on future actions.

VALIDATION COPY

Course Number and Name: **CON 2523 Project Management**

Description: This course introduces tools and techniques used in project management. Topics include defining project scope, identifying and tracking risks, identify professional development plan; analyze primary project documents including planning, estimating, scheduling, resource control, and quality control; and identify the Project Manager's role for continuous improvement**.**

.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

NCCER *Project Management*
MODULE 44101-08 – INTRODUCTION TO PROJECT MANAGEMENT

1. Define project.
2. Describe the characteristics of a project manager.
3. Describe the basic functions of project management.
4. Cite the importance of ethical approaches to project management.
5. Discuss the flow and phases of a construction project.
6. Describe the four common construction delivery systems.

MODULE 44102-08 – SAFETY

1. Recognize the need for an effective job site safety and loss prevention program.
2. Identify the project manager 's duties and responsibilities with respect to safety and loss prevention.
3. Identify the direct and indirect cost of accidents.
4. Identify potential areas for loss and evaluate the risks.
5. Identify methods of risk control.
6. Understand OSHA's Focused Inspection Program.
7. Evaluate subcontractors on the basis of past safety experience.
8. Identify the need for and types of employee participation in safety programs.
9. List things to be considered when dealing with the press.
10. Plan, implement, and evaluate a job site safety program with assistance from staff safety professionals or outside consultants.

MODULE 44103-08 – INTERPERSONAL SKILLS

1. Briefly describe workforce expectations.
2. Describe how stakeholders are identified.
3. Define effective communication skills.
4. Apply human relations skills to the project management role.
5. Apply the Managerial Grid.
6. Define the leadership environment.
7. Describe mentoring and coaching.
8. Apply behavioral interview techniques.
9. Construct professional development plans.

Module 44104-08 – Issues and Resolutions

1. Identify signs of incompetent problem solving and negative problem identification climates.
2. Identify four major barriers to problem solving.
3. Demonstrate these problem solving techniques:
    - Eight-step ladder

- Fact-finding
- Root cause diagram
- Brainstorming

4. Name five key elements of successful negotiation.
5. List four universal truths of negotiation.
6. Cite the four phases of negotiation.
7. Identify and explain the eight negotiating techniques and how to respond to them.
8. Recognize communication cues.
9. Describe the stages of dispute resolution.

MODULE 44105-08 – CONSTRUCTION DOCUMENTS

1. Explain the need for documentation on a project.
2. State the various approaches for obtaining work in the construction industry.
3. Identify the parts of a typical project manual.
4. Identify the various types of drawings and format specifications.
5. Discuss the types of contracts used in the construction industry.
6. Discuss insurance requirements for a company and a project.
7. List the types of documents used on a project.
8. Describe the change order process.
9. List the documents necessary to close out a project.

MODULE 44106-08 – CONSTRUCTION PLANNING

1. Explain the importance of planning a job.
2. Create a performance-based work environment.
3. Explain the importance of scope and the work breakdown structure.
4. State the differences among the pre-construction, construction, and review phases of planning.
5. Describe how the planning process is carried out.
6. Define the roles and responsibilities of an effective team and how to allocate resources.
7. Define commodities, engineered equipment, construction equipment, and construction supplies.
8. Describe how to implement a plan.

MODULE 44107-08 – ESTIMATING AND COST CONTROL

1. Define cost control and identify the purpose of a cost control system.
2. Define budgeted (estimated) cost, actual cost, and projected cost.
3. Define the importance of accurate estimates
4. Explain the project manager's role in controlling cost.
5. Describe what a reporting system is and how it functions in a cost control system.
6. Explain the process of making a cost analysis.
7. Perform a simple cost analysis.
8. Describe how to track and document the causes and costs of rework.

MODULE 44108-08 – SCHEDULING

1. Establish personal task priorities and delegate tasks.
2. Describe the purposes and benefits of using formal project schedules and why it is important to main- tain schedules.
3. Identify basic project scheduling terms and inputs.
4. Develop a bar chart schedule.
5. Develop and interpret a network diagram.
6. Identify alternative scheduling methods.
7. Develop and calculate CPM schedules to include early start, early finish, late start, late finish, and total float.
8. Analyze an existing CPM schedule to optimize the project schedule.
9. Update and maintain a project schedule, including establishing baselines and targets.
10. Determine the effects of a change to the schedule.

MODULE 44109-08 – RESOURCE CONTROL

1. List the five elements of production control.
2. Recognize when production is in control.
3. Describe the role of reports in production control.
4. Identify and explain the major factors which affect production control.
5. Describe methods for alleviating the negative effects of the major production control factors.
6. List the three production standards and specify when they are to be used.
7. Explain the three methods for evaluating productivity.
8. Explain and give examples of production control alternatives.
9. Identify the resources that must be controlled and the project manager ’s role in the process.
10. Describe the role of the project manager in evaluating production both during and after a project.
11. Define debriefing and describe how it is accomplished and its value to production control.

MODULE 44110-08 – QUALITY CONTROL AND ASSURANCE

1. Define quality control and quality assurance.
2. Describe the essential components of an effective quality control and assurance program (or process).
3. Explain how to develop an effective quality control and assurance process.
4. Explain how to monitor the causes and costs of rework.

MODULE 44111-08 – CONTINUIOUS IMPROVEMENT

1. Describe the project manager ’s role in the culture of continuous improvement.
2. Explain the fundamentals of a comprehensive continuous improvement process as it relates to a project and company.
3. Present the objectives and explain the basic steps in implementing a continuous improvement process.
4. Describe some applications of continuous improvement.
5. Describe how to measure improvement.
6. Explain the importance of recognizing employees for embracing the continuous improvement process along with some of the major methods.

VALIDATION COPY

Course Number and Name: **CON 261(3-6) Internship in Construction Engineering Technology I**

Description: This cooperative program between the construction industry and education is designed to integrate the student's technical studies with on-site construction experiences. It is offered only in the summer term. Credit is awarded on the basis of 1 semester hour per 45 hours of on-site experience.

Hour Breakdown:

Semester Credit Hours	Lecture	Externship	Contact Hours
3		9	135
4		12	180
5		15	225
6		18	270

National Assessment:

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply technical skills needed to be a viable member of the workforce.
    a. Prepare a description of technical skills to be developed in the internship experience.
    b. Develop technical skills needed to be a viable member of the workforce.

2. Apply skills developed in other program area courses.
    a. Perform skills developed in other program area courses.

3. Apply human relationship skills.
    a. Use proactive human relationship skills in the internship experience.

4. Apply and practice positive work habits and responsibilities.
    a. Perform assignments to develop work habits and responsibilities.

5. Work with instructor and employer to develop written occupational objectives to be accomplished.
    a. Perform written occupational objectives in the internship experience.

6. Assess accomplishment of objectives.
    a. Prepare daily written assessment of accomplishment of objectives.
    b. Present daily written reports of activities performed and objectives accomplished to the instructor.

7. Utilize a set of written guidelines for the internship experience.
    a. Develop and follow a set of written guidelines for the internship experience.

VALIDATION COPY

Course Number and Name: **CON 262(3-6) Internship in Construction Engineering Technology II**

Description: This is a continuation of CON 261(3–6) with advanced placement in the on-site construction. It is offered only in the summer term. Credit is awarded on the basis of 1 semester hour per 45 hours of on-site experience.

Hour Breakdown:

Semester Credit Hours	Lecture	Externship	Contact Hours
3		9	135
4		12	180
5		15	225
6		18	270

National Assessment: None

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply technical skills needed to be a viable member of the workforce.
    a. Prepare a description of technical skills to be developed in the internship experience.
    b. Develop technical skills needed to be a viable member of the workforce.

2. Apply skills developed in other program area courses.
    a. Perform skills developed in other program area courses.

3. Apply human relationship skills.
    a. Use proactive human relationship skills in the internship experience.

4. Apply and practice positive work habits and responsibilities.
    a. Perform assignments to develop work habits and responsibilities.

5. Work with instructor and employer to develop written occupational objectives to be accomplished.
    a. Perform written occupational objectives in the internship experience.

6. Assess accomplishment of objectives.
    a. Prepare daily written assessment of accomplishment of objectives.
    b. Present daily written reports of activities performed and objectives accomplished to the instructor.

7. Utilize a set of written guidelines for the internship experience.
    a. Develop and follow a set of written guidelines for the internship experience.

VALIDATION COPY

Course Number and Name: **CON 291(1-3) Special Problem in Construction Engineering Technology**

Description: This course is designed to provide students with an opportunity to utilize skills and knowledge gained in other Construction Engineering Technology courses. The instructor and student work closely together to select a topic and establish criteria for completion of the project.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1		2	30
2		4	60
3		6	90

National Assessment: None

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop a written plan that details the activities and projects to be completed.
    a. Utilize a written plan that details the activities and projects to be completed.
    b. Perform written occupational objectives in the special problem.

2. Assess accomplishment of objectives.
    a. Prepare daily written assessment of accomplishment of objectives.
    b. Present weekly written reports of activities performed and objectives accomplished to the instructor.

3. Utilize and follow a set of written guidelines for the special problem.
    a. Develop and follow a set of written guidelines for the special problem.

VALIDATION COPY

Course Number and Name: **CON 292(1-6)** **Supervised Work Experience in Construction Engineering Technology**

Description: This course is a cooperative program between industry and education and is designed to integrate the student's technical studies with industrial experience. Variable credit is awarded on the basis of 1 semester hour per 45 contact hours.

Hour Breakdown:

Semester Credit Hours	Lecture	Externship	Contact Hours
1		3	45
2		6	90
3		9	135
4		12	180
5		15	225
6		18	270

National Assessment: None

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply technical skills needed to be a viable member of the workforce.
    a. Prepare a description of technical skills to be developed in the internship experience.
    b. Develop technical skills needed to be a viable member of the workforce.

2. Apply skills developed in other program area courses.
    a. Perform skills developed in other program area courses.

3. Apply human relationship skills.
    a. Use proactive human relationship skills in the internship experience.

4. Apply and practice positive work habits and responsibilities.
    a. Perform assignments to develop work habits and responsibilities.

5. Work with instructor and employer to develop written occupational objectives to be accomplished.
    a. Perform written occupational objectives in the internship experience.

6. Assess accomplishment of objectives.
    a. Prepare daily written assessment of accomplishment of objectives.
    b. Present daily written reports of activities performed and objectives accomplished to the instructor.

7. Utilize a set of written guidelines for the internship experience.
    a. Develop and follow a set of written guidelines for the internship experience.

VALIDATION COPY

Course Number and Name:

Description: This course will provide knowledge

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

National Assessment: None

Prerequisite: Instructor Approved

Student Learning Outcomes:

RECOMMENDED TOOLS AND EQUIPMENT FOR CONSTRUCTION TECHNOLOGY

CAPITALIZED ITEMS

1. Computer with current operating software with multimedia (20)
2. Total station and target (2)
3. Automatic level and rod (4)
4. Scientific calculator (5)
5. Concrete mixer (1)
6. Concrete cylinder test machine (1)
7. Concrete air pot (1)
8. Scheduling software
9. GPS Rover system (1)
10. GPS Machine Control system(1)
11. 3-D modeling software
12. CADD software
13. Plotter (1)
14. Printers (3)
15. Productivity software
16. Rotating laser

NON-CAPITALIZED ITEMS

1. Wooden stakes (1 lot)
2. Ribbon flags (1 lot)
3. Markers (1 lot)
4. Hard hats (10)
5. Safety glasses (15)
6. Safety vests (15)
7. Slump cones (1)
8. Hammers (6)
9. Rebar bender/cutters (2)
10. Wheelbarrows (2)
11. Shovels (6)
12 Bullfloat (1)
13. Concrete trowels (3)
14. Rubbing rocks (2)
15. Plyform (3 sheets)
16. Concrete tie wedges (100)

RECOMMENDED INSTRUCTIONAL AIDS

It is recommended that instructors have access to the following items:

1. Data projector
2. Document camera
2. Digital camera
3. Video camera
4. Laptop or station computer

CURRICULUM DEFINITIONS AND TERMS

- Course Name – A common name that will be used by all community colleges in reporting students

- Course Abbreviation – A common abbreviation that will be used by all community and junior colleges in reporting students

- Classification – Courses may be classified as the following:
    - Career Certificate Required Course – A required course for all students completing a career certificate.
    - Technical Certificate Required Course – A required course for all students completing a technical certificate.
    - Technical Elective – Elective courses that are available for colleges to offer to students.

- Description – A short narrative that includes the major purpose(s) of the course

- Prerequisites – A listing of any courses that must be taken prior to or on enrollment in the course

- Corequisites – A listing of courses that may be taken while enrolled in the course

- Student Learning Outcomes – A listing of the student outcomes (major concepts and performances) that will enable students to demonstrate mastery of these competencies

The following guidelines were used in developing the program(s) in this document and should be considered in compiling and revising course syllabi and daily lesson plans at the local level:

- The content of the courses in this document reflects approximately 75% of the time allocated to each course. The remaining 25% of each course should be developed at the local district level and may reflect the following:
    - Additional competencies and objectives within the course related to topics not found in the state framework, including activities related to specific needs of industries in the community college district
    - Activities that develop a higher level of mastery on the existing competencies and suggested objectives
    - Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed or revised
    - Activities that include integration of academic and career–technical skills and course work, school-to-work transition activities, and articulation of secondary and postsecondary career–technical programs
    - Individualized learning activities, including work-site learning activities, to better prepare individuals in the courses for their chosen occupational areas

- Sequencing of the course within a program is left to the discretion of the local college. Naturally, foundation courses related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other courses related to specific skill areas and related academics, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors. Programs that offer an Associate of Applied Science Degree must include all of the required Career Certificate courses, Technical Certificate courses AND a minimum of 15 semester hours of General Education Core Courses. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester. Each community college specifies the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college.

- In order to provide flexibility within the districts, individual courses within a framework may be customized by doing the following:

- Adding new student learning outcomes to complement the existing competencies and suggested objectives in the program framework
- Revising or extending the student learning outcomes
- Adjusting the semester credit hours of a course to be up 1 hour or down 1 hour (after informing the Mississippi Community College Board [MCCB] of the change)

Course Crosswalk
Construction Engineering Technology

Note: Courses that have been added or changed in the 2016 curriculum are highlighted.

Existing			Revised		
2009 MS Curriculum Framework			2016 MS Curriculum Framework		
Course Number	**Course Title**	**Hours**	**Course Number**	**Course Title**	**Hours**
CON 1113	Survey of Modern Construction	3	CON 1113	Survey of Modern Construction	3
CON 1213	Construction Materials	3	CON 1213	Construction Materials	3
CON 1223	Plans and Document Interpretation	3	CON 1223	Plans and Document Interpretation	3
CON 1233	Construction Systems I	3	CON 1233	Construction Systems I	3
CON 1313	Construction Drawing	3	CON 1313	Construction Drawing	3
CON 2113	Construction Jobsite Management	3	CON 2113	Construction Jobsite Management	3
CON 2123	Construction Cost Estimation	3	CON 2123	Construction Cost Estimation	3
CON 2233	Construction Systems II	3	CON 2233	Construction Systems II	3
CON 2243	Construction Systems III	3	CON 2243	Construction Systems III	3
CON 2313	Construction Layout	3	CON 2313	Construction Layout	3
CON 2413	Construction Safety Standards	3	CON 2413	Construction Safety Standards	3
CON 2513	Leadership and Organization	3	CON 2513	Leadership and Organization	3
CON 261(3–6)	Internship in Construction Engineering Technology		CON 261(3–6)	Internship in Construction Engineering Technology	
CON 262(3–6)	Internship in Construction Engineering Technology		CON 262(3–6)	Internship in Construction Engineering Technology	
CON 291(1–3)	Special Problem in Construction Engineering Technology	1-3	CON 291(1–3)	Special Problem in Construction Engineering Technology	1-3
CON 292(1–6)	Supervised Work Experience in Construction Engineering Technology	1-6	CON 292(1–6)	Supervised Work Experience in Construction Engineering Technology	1-6
			CON 2523	Project Management	3